

A TAXONOMIC STUDY OF HYLID FROGS OF THE *HYLA LESUEURI* COMPLEX OCCURRING IN NORTH-WESTERN AUSTRALIA

BY MICHAEL J. TYLER, HONORARY ASSOCIATE IN HERPETOLOGY,
SOUTH AUSTRALIAN MUSEUM

INTRODUCTION

The *Hyla lesueuri* complex, as defined by Moore (1961), comprises a group of terrestrial species exhibiting a sequence of habitus, "that begins with stout-bodied and broad-headed forms and gradually passes to those with extremely slender bodies, long legs and narrow heads". Moore was primarily concerned with the five members of the complex occurring in New South Wales: *booroolongensis*, *freycinetti*, *latopalmata*, *lesueuri*, and *nasuta*, but examined species from other States and drew attention to several taxonomic problems associated with the identity of specimens from northern Australia. Moore had examined specimens from the Northern Territory identified as *nigrofrenata* by Kinghorn (1931) and, although unwilling to associate them with that species, considered that they differed in certain respects from *lesueuri* to which Copland (1957) had referred them. Accordingly, Moore's list of the representatives of the complex occurring in northern Western Australia and the Northern Territory recorded *latopalmata* and *nasuta* in both areas plus either *nigrofrenata* or *lesueuri* in the latter.

Hosmer (1964) described *Hyla spaldingi* a new species of the complex from the Northern Territory and suggested that material examined by Moore, and other records of *lesueuri* from this region, were probably based on *spaldingi*.

Several large collections of *Hyla* from northern parts of Western Australia and the Northern Territory were found to include four widely distributed species that were clearly members of the *lesueuri* complex. As one represented what appeared to be an undescribed species, the type specimens of species of northern Australian origin synonymised within the complex were examined to confirm their status. The only Queensland and New South Wales members of the complex reported here are those common to Western Australia and the Northern Territory, thus minimizing repetition of data presented by Moore (1961).

MATERIALS AND DESCRIPTIVE METHODS

The 310 specimens reported here are lodged in museum collections abbreviated as follows:—Australian Museum (A.M.); American Museum of Natural History (A.M.N.H.); British Museum (Natural History) (B.M.);

Museum of Comparative Zoology (M.C.Z.); Naturhistoriska Riksmuseet (N.R.); South Australian Museum (S.A.M.); United States National Museum (U.S.N.M.); Western Australian Museum (W.A.M.). Letters preceding registration numbers refer to departmental catalogue references, and numbers in parentheses following registration numbers indicate specimens catalogued collectively under a single number.

The following abbreviations appear in the text and tables:—E-N/IN (ratio of the eye to naris distance to the internarial span); HL/HW (head length to head width ratio); HW/S-V (head width to snout to vent length ratio); and TL/S-V (tibia length to snout to vent length ratio). Methods of measurement and descriptive techniques conform to those employed for *Hyla* by Tyler (1968).

Most literature references cited in the synonymies refer at least in part to Western Australian or Northern Territory specimens.

MORPHOLOGICAL CRITERIA

All of the 13 morphological features by which Moore (1961, p. 310) distinguished New South Wales members of the *lesueuri* complex, are equally suitable for distinguishing those occurring in northern Australia. However, even in those species which have the most distinctive habitus (*e.g.*, *Hyla nasuta*) there are few unique characters and it is necessary to compare at least three or four to provide an objective identification. Thus it is desirable to draw attention to the advantages and disadvantages of some of them.

In each species the posterior surface of the thighs bears an irregular pattern of light and dark markings. These markings are liable to fade in preservative for Andersson (1913) reported that in *affinis* they were, "more or less marbled with black and white", whereas the same specimens are now marbled with light brown on a dull yellow background. It was Andersson's descriptive notes which led Copland (1957) to erroneously conclude that the specimens were examples of *latopalmata watjulumensis*. In at least one member of the complex the thighs are marbled with brown on a yellowish background in freshly preserved material.

There is frequently considerable intraspecific variation in the ratios of head length/head width, tibia length/snout to vent length, etc., as illustrated in Tables 1 and 2. However, plotting series in the form of point frequency diagrams during initial studies (*e.g.*, Fig. 3) provided means of separating populations prior to more detailed examination.

The extent of development of terminal digital discs and the presence or absence of circum-marginal grooves differs markedly between some species.

Particular emphasis has been placed upon this feature, as it proved of considerable value in distinguishing the sexually immature specimens which formed the bulk of most collections. No indications of ontogenetic trends have been noted.

ACCOUNT OF SPECIES

Hyla wotjulumensis Copland

Hyla lesueurii. (part) Copland (1957), p. 92.

Hyla latopalmata wotjulumensis (part) Copland (1957), Proc. Linn. Soc. N.S.W., 82 (1), p. 96.

Hyla spaldingi Hosmer (1964), Amer. Mus. Novit., No. 2182, p. 2, figs. 3-4.

Emendation of Specific Name: The spelling of the stem of the sub-specific name and the type locality from which it is derived are in error in the original description. Glauert (1959) refers to the locality as Wotjulum and it is spelt that way on maps. The taxon is therefore emended to *wotjulumensis* in accordance with the provisions of Article 33a of the International Code of Zoological Nomenclature.

Types: Regrettably none of the 36 specimens examined by Copland are specifically designated as types. However, in a discussion following a list of the specimens examined and literature records considered to be based on this subspecies, he refers to "Watjulum Mission", as "the type locality". Twenty-nine specimens are listed from that locality and these are subsequently referred to here as the syntypes: W.A.M. 11195-9, 11633-5, 11638, 11896-11907, 11932-9. One (R.11195) is an extremely dehydrated specimen of *Hyla peroni*, and three more (R.11197, 11638, 11939) are representatives of a new species described in the present paper; these are therefore excluded from further consideration. Another complication is caused by two specimens bearing tags with identical registration numbers (R.11897). There is no indication which was examined by Copland, and the total of 29 precludes one of them. One has therefore been allotted a new catalogue number (R.29763) and is not regarded a syntype. Selection for re-registration was purely arbitrary and does not materially affect the definition of the species in any way. Several further specimens have not been found with the result that the following data are based on only 18 of the syntype series, namely: W.A.M. R.11198-9, 11633, 11896-9, 11901-3, 11906-7, 11932-3, 11935-8. The syntypes were collected by K. G. Buller and A. M. Douglas. The dates of collection are unknown.

Seventeen of the syntypes are females with a snout to vent length range of 45.7-54.1 mm. The TL/S-V, E-N/IN and HL/HW ranges and means are recorded in Table J.

TABLE 1
 Ratios and Measurements of *Hyla wotjulumensis*, *Hyla nasuta* and *Hyla coplandi*

	F	TL/S-V	E-N/IN	HL/HW	Adult Size (S-V in mm.)	
					♂♂	♀♀
<i>wotjulumensis</i> Syntypes	18	.593-.704 (.654)	1.000-1.178 (1.069)	1.056-1.260 (1.144)	—	45.7-54.1
Kalumburu.....	4	.633-.714 (.673)	1.000-1.044 (1.019)	1.057-1.220 (1.148)	33.8	45.2
Katherine	6	.673-.699 (.686)	.929-1.025 (.962)	1.120-1.169 (1.146)	—	—
90m. N. of Mainoru ..	15	.603-.732 (.683)	.918-1.170 (.994)	1.080-1.204 (1.148)	33.3-35.7	45.4-51.8
<i>nasuta</i> All specimens	13	.643-.779 (.698)	1.000-1.188 (1.139)	1.206-1.429 (1.285)	31.4-32.1	36.2-42.8
<i>coplandi</i> Inverway Station	7	.535-.618 (.581)	.949-1.120 (1.020)	1.042-1.131 (1.075)	33.3-34.7	38.8
Wave Hill	9	.525-.641 (.584)	.920-1.077 (1.009)	1.025-1.144 (1.067)	33.4-33.5	40-40.2
Kalumburu.....	4	.577-.631 (.608)	1.000-1.118 (1.065)	.985-1.105 (1.030)	33.8-34.8	35.2
Bugle Gap	5	.542-.634 (.602)	.974-1.088 (1.030)	1.035-1.093 (1.069)	31.2	35.7-37.9
23m. S.S.E. Wyndham.	5	.592-.630 (.610)	1.000-1.063 (1.031)	1.014-1.097 (1.043)	—	38.3

Synonymy: The holotype of *Hyla spaldingi* Hosmer (1964) has been examined and the species is referred to the synonymy of *wotjulumensis*.

Additional Material Examined: 83 specimens:—

Western Australia—

Kalumburu—W.A.M. R.13752D, 13754, 13759A, 13759C-G, 13761.

Noonkanbah, Fitzroy River—W.A.M. R.26199.

Parry Creek—W.A.M. 29568.

Wotjulum Mission—W.A.M. R.29763.

Northern Territory—

Coomalie Creek (16m. N. of Adelaide R.)—W.A.M. R.26245.

Elizabeth River (50m. S. of Darwin)—W.A.M. 23886 (formerly A.M.N.H. 67835), holotype of *H. spaldingi*.

Katherine—S.A.M. R.4876; W.A.M. R.26136-40.

55m. N. of Mainoru—S.A.M. R.9132(13).

73m. N. of Mainoru—S.A.M. R.9038-40.

90m. N. of Mainoru—S.A.M. R.9046-60.

98m. N. of Mainoru—S.A.M. R.9041-45, 9086-96.

Yam Creek—A.M. R.4914, 4916, 4918, 4921, 4926.

Descriptive Notes: Measurements of several of the series listed above are included in Table 1. The combination of fully webbed toes and a broad continuous lateral head stripe, uninterrupted behind the tympanum, distinguishes this species from other members of the complex. The pre-ocular

portion of the head stripe extends from the tip of the snout, and continues as a narrow line along the inferior margin of the tympanic annulus, and proceeds in a straight line to a point beyond the axilla. The superior margin of the postocular portion is on a level with the position usually occupied by a supratympanic fold (absent in this species). The head stripe is black, the contrast against the background being determined by the density of the chromatophores.

The dorsum varies from pale olive to dark grey with or without faint suffusions or mottling of darker pigment. A trace of a faint, broad transocular bar is visible in most specimens. The throat is white or stippled with isolated melanophores, densest on the mandibular border where they are interrupted by a few large, circular islands of very pale cream. The backs of the thighs are usually pale yellow heavily reticulated with irregular black or dark grey markings.

Distribution: The known geographic range of *wotjulumensis* extends over a distance of approximately 1,000 miles between Wotjulum and Red-Bank Mine near Wologorang (cited for *spaldingi* by Hosmer, 1964).

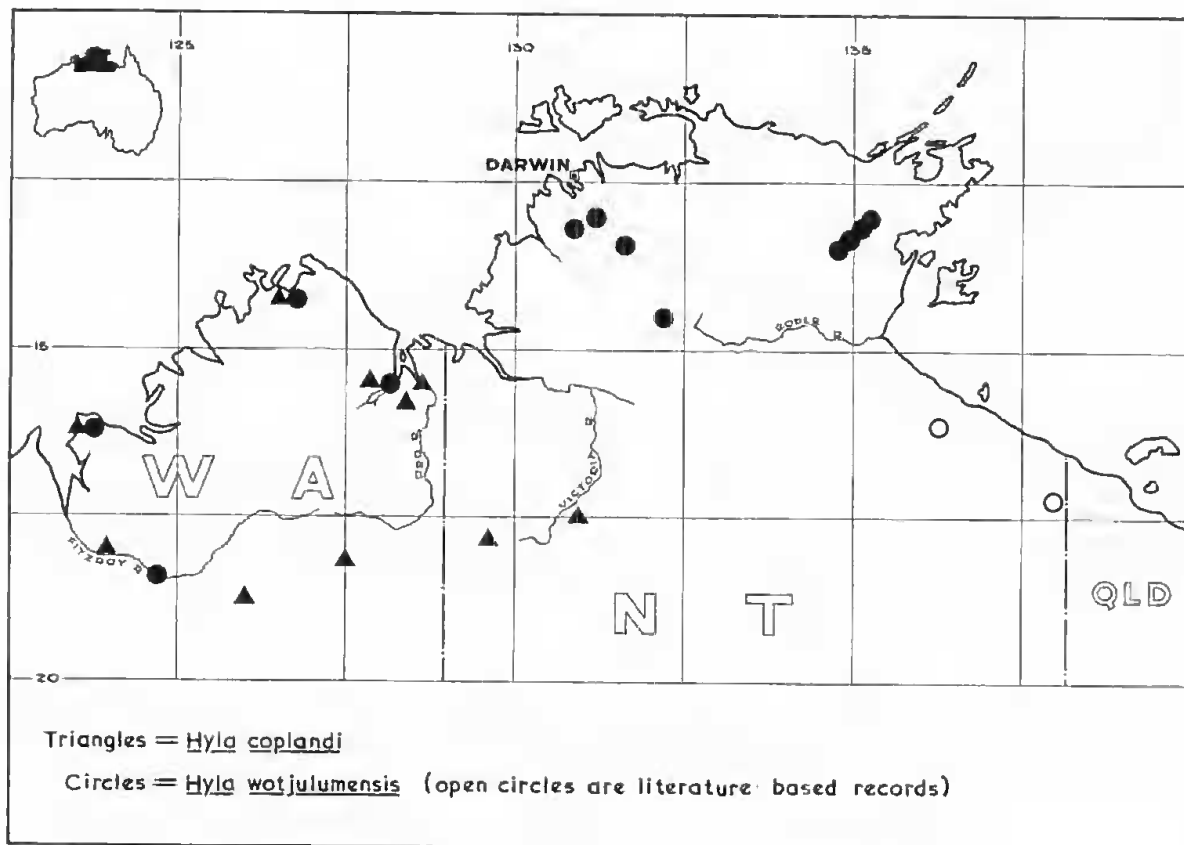


FIG. 1.
Distribution of *Hyla coplandi* and *H. wotjulumensis*.

In the absence of any geographical or environmental barrier the extension of its distribution eastwards into Queensland seems likely. The only literature based locality records included in the distribution map (Fig. 1) are those cited by Hosmer (1964) for *spaldingi* specimens examined by that author.

***Hyla coplandi* new species**

Hyla latopalmata watjulumensis (part) Copland (1957), Proc. Linn. Soc. N.S.W., **82** (1), p. 96.

Holotype: W.A.M. R.13722G. A gravid female collected at Inverway Station, Northern Territory by K. G. Buller on 8 August, 1960.

Definition: A moderately sized species with a maximum snout to vent length of 41.8 mm., characterized by the combination of the following features: unwebbed fingers, fully webbed toes, dilated terminal digital discs, appposable first finger, large tympanum and a prominent gland at the angles of the jaws.

Description of Holotype: The head is longer than broad (HL/HW 1.054), its length equivalent to considerably more than one-third of the snout to vent length (HL/S-V 0.402). The snout projects only slightly; it is rounded when viewed from above and evenly rounded in profile. The nares are high and oblique, their distance from the end of the snout less than that from the eye. The distance between the eye and the naris is slightly greater than the internarial span (E-N/IN 1.053). The canthus rostralis is very poorly defined and straight. The loreal region is slightly concave. The eye is not prominent, its diameter equal to the eye to naris distance. The tympanum is prominent, its diameter equivalent to almost seven-eighths of the eye diameter, and separated from the eye by a distance equivalent to one-third of its own diameter. The vomerine teeth are situated on each side of the midline on two rounded elevations on a ridge overhanging the anterior margins of the choanae. The tongue is broadly cordiform with a feeble posterior indentation.

The fingers are long and slender with narrow lateral fringes and very large sub-articular tubercles. In decreasing order of length $3 > 4 > 1 > 2$. There is no inter-digital webbing. The terminal discs are dilated (Fig. 2).

The hindlimbs are long and slender with a TL/S-V ratio of .601. Toes in decreasing order of length $4 > 5 = 3 > 2 > 1$. The interdigital webbing reaches the base of the terminal discs of all toes except the fourth where it extends as far as the sub-articular tubercle at the base of the penultimate phalanx, and is united to the disc by a narrow lateral fringe (Fig. 2).

There are numerous small, rounded granules on the entire dorsal surface of the head and body. At the angle of the jaws is a small but prominent, roughly circular gland composed of a group of large granules, and the sides of the body are covered with granules, more numerous than on the dorsum.

There is a very poorly developed supra-tympanic fold, a skin fold on the outer edge of the forearm, a sharp fold on the outer surface of the tarsus and a fold across the chest. There is an extremely prominent oval outer metatarsal tubercle. Supernumerary tubercles on the foot are well developed. The throat is smooth but for a few very small isolated granules, and the abdomen and posterior thighs very coarsely granular.

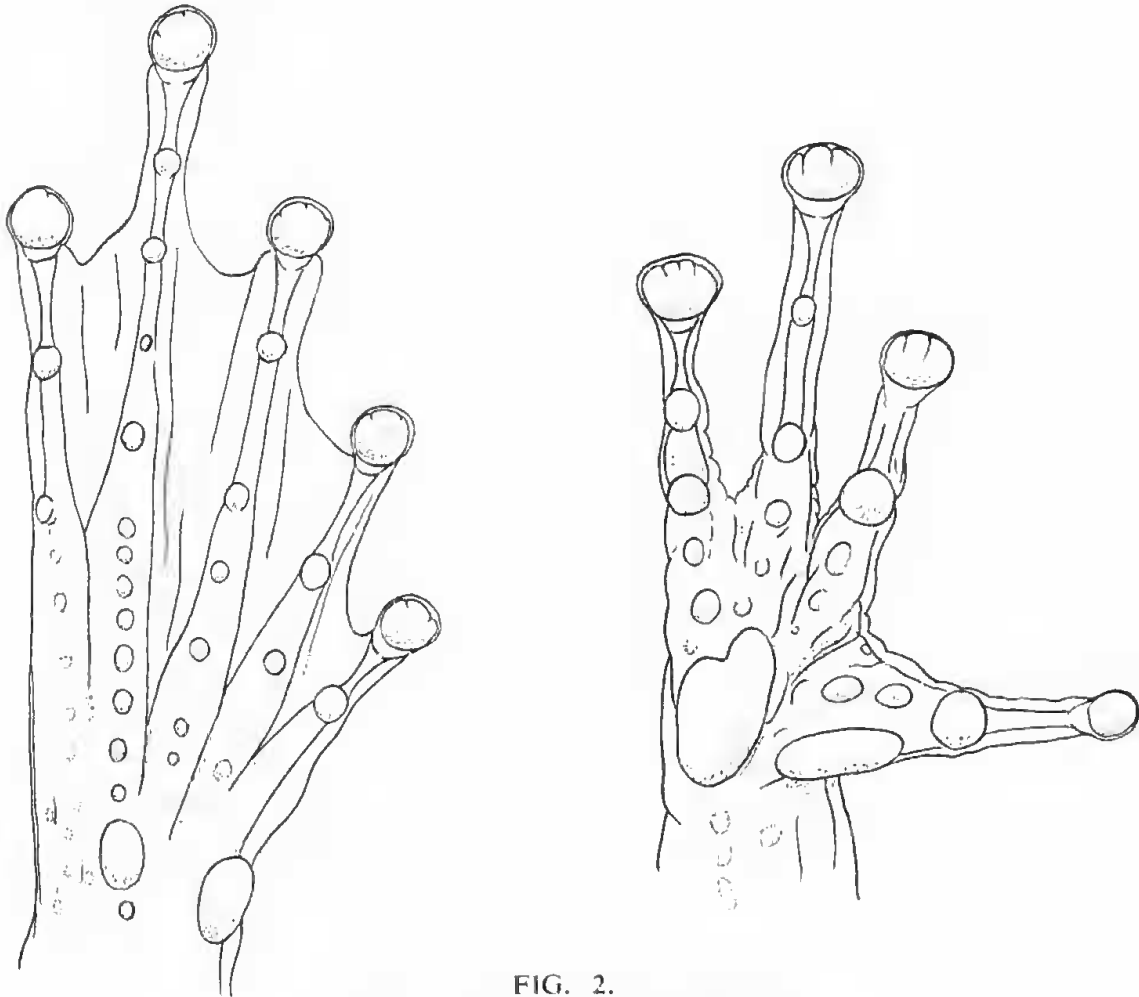


FIG. 2.
Foot and hand of *Hyla coplandi*.

Dimensions: Snout to vent length 38.8 mm.; tibia length 23.3 mm.; head length 15.6 mm.; head width 14.8 mm.; eye to naris distance 4 mm.; internarial span 3.8 mm.; eye diameter 4 mm.; tympanum diameter 3.4 mm.

In preservative the dorsal surface of the body and limbs is a dull brown with extremely obscure and irregular darker markings. The posterior surface of the thighs is a very dark brown bearing small creamish patches. The gland at the angle of the jaws and most of the granules on the sides of the body are dull yellow. The undersurface of the tarsus and foot are charcoal grey.

Variation: There are eight paratypes: W.A.M. 13722E-F collected with the holotype at Inverway Station and W.A.M. 13724A-D, 13724I, S.A.M. R.9103 (formerly W.A.M. R.13722D) collected at Wave Hill, Northern Territory by K. G. Buller on 11 August, 1960. Males in the paratype series bearing nuptial pads have snout to vent lengths of 33.5-34.7 mm., and the females are 37.3-40.2 mm. In their proportions and coloration they do not differ markedly from the features of the holotype (see Table 1 for measurements and ratios of types and topotypes).

A further 47 representatives of this species have been examined:

Northern Territory—

Inverway Station—W.A.M. R.13722A-C.

Wave Hill—W.A.M. R.13724E-H.

Western Australia—

Bugle Gap—W.A.M. R.21354-8, 26235-7.

Kalumburu—W.A.M. R.13762, 13764A-B, 13775B, 29547, 29550-1.

Kununurra—S.A.M. R.5083.

Moolabulla—S.A.M. R.5537.

Mt. Anderson—W.A.M. R.29558-60.

Parry Creek—W.A.M. R.29570-2.

Wotjulum—W.A.M. R.11197, 11939, 11638 (syntypes of *latopalmata wotjulumensis*).

23m. S.S.E. of Wyndham—W.A.M. R.26122-3, 26125, 26127, 26134.

The smallest male bearing nuptial pads (W.A.M. R.21357) has a snout to vent length of 31.2 mm. A gravid female (S.A.M. R.5083) is the largest examined, measuring 41.8 mm. A specimen from Parry Creek (W.A.M. R.29571) is depicted in Fig. 5.

Comparison with Other Species: *Hyla coplandi* differs from all other species of the *lesueuri* complex occurring in north-western Australia in lacking anterior and posterior lateral head markings. *Hyla wotjulumensis* is the only species sharing with *coplandi* fully webbed toes but, in addition to possession of broad, and usually particularly conspicuous head stripes, *wotjulumensis* has a more elongated snout and a correspondingly longer head than *coplandi*, as indicated by comparison of the HL/HW ratios (1.056-1.260 in *wotjulumensis* and 0.985-1.063 in *coplandi*). In *Hyla coplandi* the terminal digital discs are strongly dilated and usually approximately twice the width of the penultimate phalanges, whereas in *wotjulumensis* the discs are only slightly broader than them. The latter feature also distinguishes *latopalmata* and *nasuta* from *coplandi*. These three species may also be distinguished by differences in HW/S-V proportions (Fig. 3).

Of the species confined to eastern Australia, *Hyla booroolongensis* shares with *coplandi* similarly extensive webbing between the toes and dilated terminal discs. The former species differs from *coplandi* in the following respects: The first finger is shorter than (not longer than) the second; the head is consistently broader than long (longer than broad in 55 of 56 *coplandi*); the vomerine teeth are set more posteriorly in relation to the position of the choanae, there is no gland at the angle of the jaws and the outer metatarsal and supernumerary tubercles are not as well developed. *Hyla booroolongensis* evidently attains a larger size than *coplandi*, for the maximum snout to vent length recorded by Moore (1961) was 50.5 mm., whereas the largest *coplandi* measures 41.8 mm.

Distribution: The known geographic range of *coplandi* extends as far south as the Fitzroy River in Western Australia, and east to Wave Hill near the source of the Victoria River in the Northern Territory (Fig. 1). The eight Western Australian localities at which it has been collected lie in a circle, which may be more of an indication of the accessibility of certain localities than a true representation of the distribution of the species. No specimens of *coplandi* have been included in several large collections examined from the northern portion of the Northern Territory; much of this material was from Arnhem Land.

***Hyla latopalmata* (Gunther)**

Pelodytes affinis Gray (1842), Zool. Misc. p. 56.

Hyla affinis, Boulenger (1882), p. 413; Andersson (1913), p. 24.

Litoria latopalmata Gunther (1867), Ann. Mag. nat. Hist. Ser. 3, Vol. 20, p. 55.

Hyla latopalmata, Boulenger (1882), p. 414; Loveridge (1935), p. 52; Moore (1961), p. 298.

Hyla tornieri Nieden (1923), Das Tierreich No. 46, p. 228.

Hyla lesueurii, Mitchell (1955), p. 404; Copland (1957) (part), p. 89; Mitchell (1964), p. 339.

Hyla latopalmata latopalmata, Copland (1957), p. 94.

This species either exhibits greater morphological variation than any other member of the complex or comprises two populations meriting distinct taxonomic recognition. Evidence obtained in the present studies favours the former hypothesis but the latter cannot be completely excluded. However, it is considered that biological data are more likely to establish the matter and at the present time none are available.

The geographic range of *latopalmata* extends in the form of a continuous arc from New South Wales to Western Australia—a distance of approximately 3,000 miles. Comparison of adult specimens from Western Australia (previously reported as *Hyla affinis* by Andersson, 1913) with

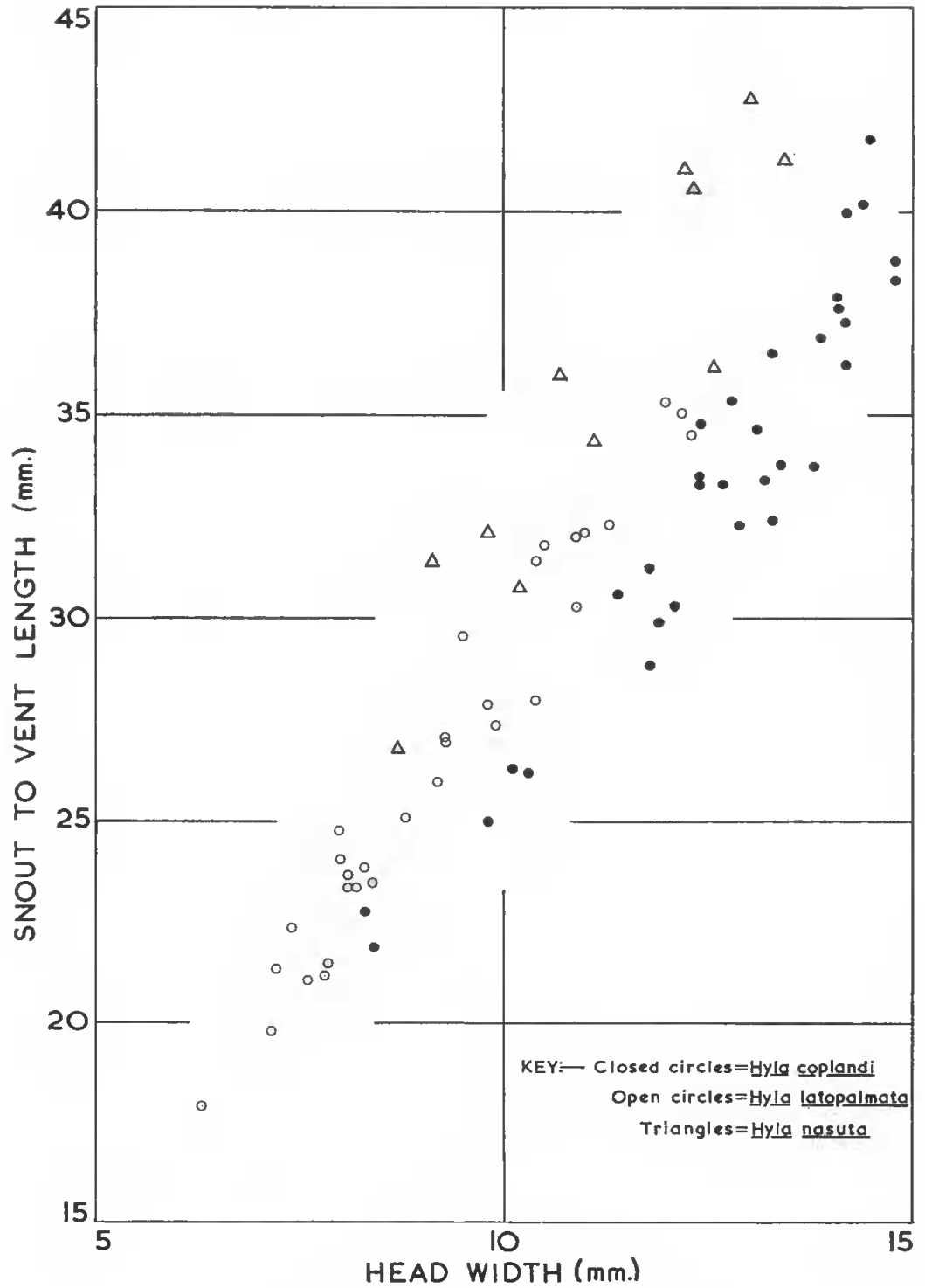


FIG. 3.
 Head width/snout-vent length in three species of *Hyla*.

adults from southern Queensland and New South Wales reveals striking differences (see Table 2 for a comparison of measurements). The Western Australian frogs are smaller than those from the eastern States, have shorter limbs and are always dull brownish dorsally (never the dull grey common to most preserved eastern specimens). The lateral head stripes are only slightly darker than the background coloration whereas in eastern frogs they are black and extremely conspicuous. The terminal digital discs of Western Australian frogs are always undilated and no broader than the width of the penultimate phalanx, whereas eastern individuals invariably exhibit dorso-ventral flattening and, in those instances where they are distinctly broader than the penultimate phalanges, a circum-marginal groove is detectable.

There are further minor points of divergence in the extent of interdigital webbing and development of supernumerary tubercles on the plantar surface.

As indicated by the data presented in Table 2, at intermediate localities there is a wide range of variation in the proportions of individuals. Of the characters considered above the only consistent geographic trends noted involve terminal digits and interdigital webbing. Dilation with or without lateral expansion beyond the penultimate phalanges has not been observed in any frogs collected north or west of central Queensland, and the webbing is definitely most extensive in frogs from southern Queensland and New South Wales. Frogs with dilated and undilated terminal phalanges evidently occur in the latter area as evidenced by comparison of Moore's (1961) line figure of the hand, with the hand of the individual illustrated in his plate 45.

TABLE 2
Proportions of *Hyla latopalmata*

	F	TL/S-V	E-N/IN	HL/HW	Adult Size (S-V in mm.)	
					♂♂	♀♀
Port Essington, N.T. (<i>affinis</i> holotype) . . .	1	.547	1.167	1.025	34.3	—
Bowen, Qsld. (<i>latopalmata</i> syntype)	1	.614	1.072	1.045	—	36.3
Vicinity of Fitzroy River, W.A.	5	.518-.548 (.532)	.936-1.000 (.978)	1.062-1.091 (1.077)	—	32.1-36.3
Kununurra, W.A. . . .	8	.531-.571 (.545)	.921-1.095 (.997)	1.173-1.311 (1.222)	—	—
Mornington Island, Qsld.	46	.606-.673 (.633)	.906-.971 (.951)	1.131-1.262 (1.189)	—	—
Bullman Waterhole, N.T.	11	.604-.686 (.644)	.897-1.000 (.950)	1.074-1.271 (1.168)	—	—
Doomadgee Station, Qsld.	2	.610 (.610)	.920-.964 (.942)	1.139-1.189 (1.164)	—	—
South Queensland and N.S.W.	7	.585-.664 (.632)	.892-1.107 (1.038)	1.054-1.124 (1.078)	31.9-32.8	37.3-42.4
73m. N. of Mainoru, N.T.	8	.574-.617 (.597)	.920-1.087 (1.019)	1.083-1.205 (1.137)	—	—

Material Examined: 139 specimens:—

Western Australia—

- Kununurra—S.A.M. R.5827 (9).
 Noonkanbah—N.R. 1578.
 Parry Creek—W.A.M. R.29567, 29569.
 St. George Range—N.R. 1579-80; M.C.Z. 18000.
 23m. S.S.E. of Wyndham—W.A.M. R.26124, 26126, 26128-33,
 26135.
 Yeeda—N.R. 1577.

Northern Territory—

- 7m. S. of Adelaide River—W.A.M. R.26249-50.
 Berry Springs, 15m. S.S.E. of Darwin—S.A.M. R.8983-5.
 Bulman Waterhole—S.A.M. R.8174 (11).
 Coomalie Creek—W.A.M. R.26244.
 Ingaladdie Waterhole—S.A.M. R.8174 (11).
 Katherine—W.A.M. R.13951, 26141-4.
 Katherine Gorge—S.A.M. R.4874 (7).
 Koolpinyah Stn.—A.M.N.H. 43835.
 78m. N. of Mainoru—S.A.M. R.9064-71.
 83m. N. of Mainoru—S.A.M. R.9062-3
 98m. N. of Mainoru—S.A.M. R.9072-3.
 90m. N. of Mainoru—S.A.M. R.9105.
 Mt. Bundy Stn.—S.A.M. R.4878 (2).
 Newcastle Waters—S.A.M. R.4873 (2).
 Oenpelli—U.S.N.M. 128719.
 ?Port Essington—B.M. 1947.2.22.73 (holotype of *Pelodytes affinis*).
 Wilton River Crossing, 68m. N. of Mainoru—S.A.M. R.9135(6).

Queensland—

- Brisbane—S.A.M. R.3643, 6321 (2).
 Doomadgee Stn.—S.A.M. R.5013 (2).
 Mornington Is.—S.A.M. R.4935 (46).
 St. George—S.A.M. R.3692, 3737.
 Woodridge—S.A.M. R.3648.

New South Wales—

- Darling River—S.A.M. R.5470 (3).
 Macquarie River—S.A.M. R.5464 (3).

Distribution: On the distribution map of Moore (1961) there are very few records from Western Australia and the Northern Territory, and there is a wide gap between the most eastern Northern Territory record and the east coast of Queensland. Figure 4 provides a more detailed picture of the distribution of the species in the northern portion of the continent.

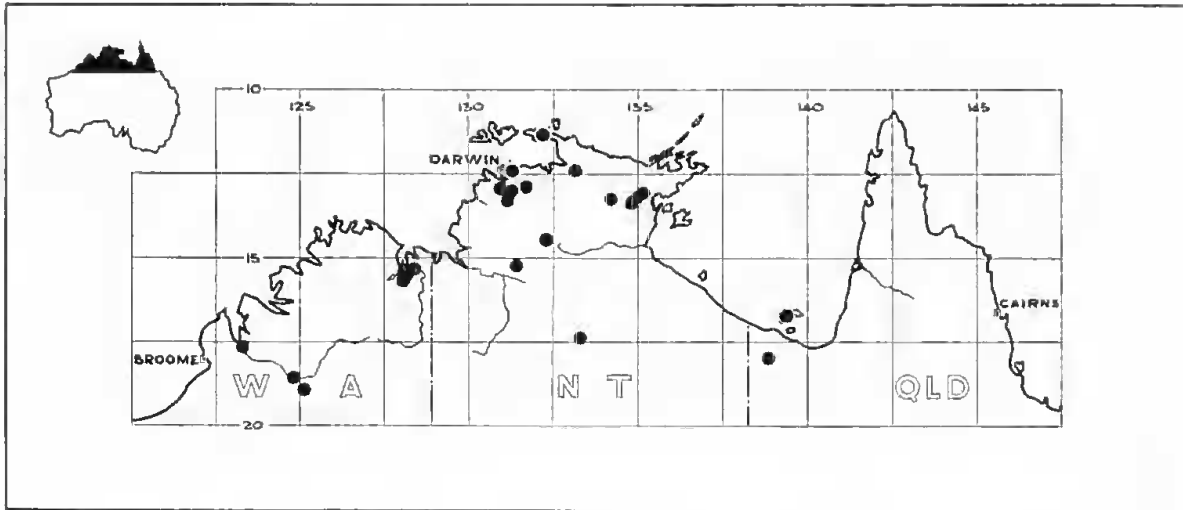


FIG. 4.

Distribution of *Hyla latopalrnata* in Northern Australia.

Hyla nasuta (Gray)

Pelodytes nasutus Gray (1842), Zool. Misc., p. 56.

Hyla nasuta, Fry (1914), p. 210; Mitchell (1955), p. 405; Copland (1957), p. 100; Moore (1961), p. 305; Mitchell (1964), p. 340.

In view of the extensive literature on this species comments are confined here to details of the specimens on which the data in Table 1 are based, a comparison with other members of the *lesueuri* complex occurring in north-western Australia and details of distribution.

Material Examined: 13 specimens:—

Western Australia—

Kalumburu—W.A.M. R.13752A-C, 13777, 29541-2.

Kununurra—S.A.M. R.5082 (2).

Northern Territory—

7m. S. of Adelaide River—W.A.M. R.26248.

Cape Don—W.A.M. R.26680.

Coomalie Creek (16m. N. of Adelaide River)—W.A.M. R.26243.

Groote Eylandt—S.A.M. R.3253 (2).

Comparison with Other Species: Pronounced elongation of the head producing a very high HL/HW ratio (Table 1), the extreme reduction of webbing between the toes and the presence of longitudinal skin folds and stripes on the body, are a combination of features not shared by any other member of the complex occurring in Western Australia and the Northern Territory.

Distribution: The only specimens of *nasuta* previously collected in Western Australia are three from Napier Broome Bay reported by Fry (1914). One of these was seen by Moore (1961) and the locality was represented on his distribution map. Kalumburu is situated on Napier Broome Bay and the only further Western Australian specimens known to be in existence are those from Kununurra on the Ord River near the State boundary.

***Hyla nigrofrenata* Gunther**

Hyla nigrofrenata Gunther (1867), Ann. Mag. nat. Hist., Ser. 3, Vol. 20, p. 56; Boulenger (1882), p. 413; Moore (1961), p. 312.

Moore (1961) examined the syntypes of *nigrofrenata* and resurrected the species from the synonymy of *lesueuri* to which it had been referred by Loveridge (1935). One of these syntypes (B.M. 1947.2.23.46) and other material reported in the literature as *nigrofrenata* have been re-examined, and the conclusion reached that no specimens clearly conspecific with the types have been subsequently examined. It is possible that the species will ultimately prove to have a limited geographic range within Queensland.

This species can be distinguished from those occurring in the Northern Territory and Western Australia as follows:

The webbing on the foot of *nigrofrenata* extends midway up the penultimate phalanx on the fifth toe. This feature distinguishes the species from *coplandi* and *wotjulumensis* where the webbing reaches the base of the disc. The presence of lateral head stripes distinguishes *nigrofrenata* from *coplandi* and its form (disrupted behind the eye) is unlike that of *nasuta* and *wotjulumensis*. Although *latopalmata* shares a disrupted posterior head stripe, in *nigrofrenata* the posterior portion is as broad as the portion immediately behind the eye (as depicted in the illustration of Boulenger, 1882) whereas in *latopalmata* it is very much narrower. None of the 139 specimens of *latopalmata* examined bear the slightest resemblance to *nigrofrenata* in this respect.

Hyla nigrofrenata is evidently a larger species than *latopalmata*, for the syntype is an adult male with a snout to vent length of 42.3 mm. This is as large as the largest female *latopalmata* examined by the writer (42.4 mm.) and Moore (1961) (42.5 mm.).



FIG. 5.
Hyla coplandi.

KEY TO THE *HYLA LESUEURI* COMPLEX OF WESTERN AUSTRALIA AND THE NORTHERN TERRITORY

1. Webbing reaches base of terminal disc on fifth toe 2
- Webbing does not extend beyond a point approximately midway up penultimate phalanx on fifth toe 3
2. Finger and toe discs distinctly dilated and approximately twice the breadth of penultimate phalanges; lateral head stripe absent; S-V length of gravid females less than 45 mm. *Hyla coplandi*

- Finger and toe discs slightly dilated and scarcely broader than penultimate phalanges; broad lateral head stripes present; S-V length of gravid females greater than 45 mm. *Hyla wotjulumensis*
3. Disc and two phalanges of fourth toe free from web; head markedly elongate with HL/HW ratio exceeding 1.275; broad continuous longitudinal stripes and narrow skin folds on body *Hyla nasuta*
- Disc and no more than penultimate phalanx of fourth toe free from web; head, if elongate, with HL/HW ratio less than 1.275; neither longitudinal stripes nor skin folds on body *Hyla latopalmata*

SUMMARY

Four species of the *Hyla lesueuri* complex are reported from Western Australia and the Northern Territory: *Hyla coplandi* new species, *H. latopalmata*, *H. nasuta* and *H. wotjulumensis*. The morphological variation of each species is discussed and tabulated and distribution data presented. *Hyla nigrofrenata* is compared with these species and excluded from the Northern Territory fauna.

The following nomenclatural changes are proposed:

Hyla latopalmata wotjulumensis Copland = *Hyla wotjulumensis* Copland.
Hyla spaldingi Hosmer = *Hyla wotjulumensis* Copland.

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